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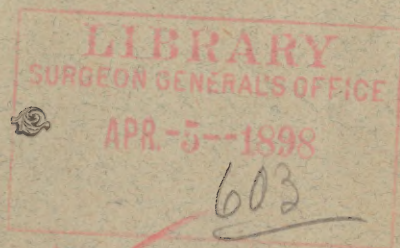
ESERINE.



THE RELATION OF EYE SYMPTOMS TO
URINARY EXCRETION,—A
CLINICAL STUDY.



READERS' CRAMP.



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ESERINE—ITS RANGE OF USEFULNESS.*

BY EDWARD W. WRIGHT, M.D.

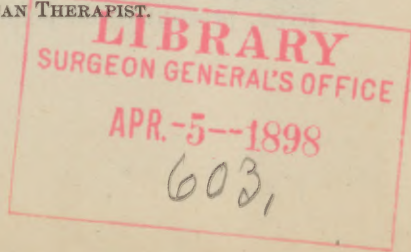
ESERINE, an alkaloid of the Calabar Bean, is dispensed in the form of salicylate and sulphate, the former being less irritating to the eye. For instillation into the eye we use a solution in distilled water varying in strength from $\frac{1}{20}$ grain to 4 grains to the ounce. It is well to add 5 to 10 grains of boracic acid to each ounce to preserve its purity. Solutions when fresh are colorless, but when kept a few days become pinkish, then reddish-brown, though the power of the drug is not lost but is more irritating to the eye.

An instillation of a drop or two of a solution of 2 grains to the ounce causes the pupil to begin to contract in three or four minutes, and in about half an hour it is reduced to the size of a pin's head. The action of the drug lasts a few hours.

Eserine in the eye causes a spasmodic contraction of the ciliary muscle, producing spasm of the accommodation. This effect passes away in an hour or two. Therefore, to act on the iris only, a drop twice a day is sufficient, while the ciliary muscle would require a drop several times in twenty-four hours. Eserine will under favorable conditions reduce increased intraocular tension by stretching the iris across the anterior chamber, thus enlarging the iritic angle formed at the junction of the cornea and iris, and permitting a freer flow into the canal of Schlemm.

The effect of Eserine is produced by stimulation of the fibres of the third nerve. Many believe that Eserine causes a paralysis of the sympathetic nerve. It would seem that those who believe that there is no dilator pupillae

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muscle think that this drug paralyses the inhibitory action of the sympathetic, while those who think there is such a muscle, believe that Eserine stimulates the fibres of the third nerve. In the first volume of Norris and Oliver, just published, Dr. Baker writes; "The combined anatomical and physiological evidence of radically arranged dilator muscle now appears conclusive."

The drug makes itself felt in various ways, according to the strength of the solution, the condition of the eye and the sensitiveness of the person. Generally there are slight twitchings, a sensation as though the lids would not move easily over the globe, at times some tension or pain and occasionally headache.

These disadvantages may be materially lessened by never using a solution stronger than one grain to the ounce, and this strength will be found to be more efficacious for all eye affections than solutions of two, three or four grains to the ounce. So a prescription for "Eserine drops" might be written thus:

R. Eserinae salicylat..... gr. i.,
Cocainae hydrochlor... gr. i.,
Acid. Boracic..... gr. vii.,
Aquae Distill..... oz. i.
Sig. One drop when directed.

In its action Eserine is opposed to atropine.

Eserine contracts the pupil; atropine dilates.

Eserine stimulates the ciliary muscle; atropine paralyses it.

Eserine produces spasm of accommodation; atropine relaxes it.

Eserine may reduce the intraocular tension; atropine may increase it.

Eserine will contract the pupil when dilated by atropine; atropine will dilate when contracted by Eserine.

Eserine is shorter in its effects than atropine; atropine is much stronger in its action than Eserine.

Contraindications.—Eserine should not be used when there is spasm of accommodation, follicular conjunctivitis, iritis, present or suspected, and in the aged.

Mydriasis.—When the eyes have lost their vision from intraocular disease, and the pupils are dilated, Eserine may be used for cosmetic purposes to contract the pupil. When atropine or homatropine has been used for refractive purposes, Eserine will hasten the return of the eye to its former condition. The dilatation of the pupil and the paralysis of the ciliary muscle as sequel to diphtheria are aided in their restoration by frequent instillation of a solution of Eserine, one grain to the ounce. Dilatation of the pupil caused by a blow may be coaxed back to its normal state with weak solutions of this drug used often.

Phlyctenulae.—In these affections Eserine in the strength $\frac{1}{4}$ grain to 1 ounce, dropped in the eye three or four times a day, will by its power of contracting the blood vessels aid in the cure. Atropine is generally used in this affection and is preferred if iritis is present or suspected. In the school-child or adult atropine prevents the return for some days to their duties after the cure of the phlyctenula, while Eserine may permit the occupation to be followed during the attack and always immediately after the trouble is over.

Corneal Ulcers.—When we find a deep ulcer on the periphery of the cornea that we fear may rupture, it is wise to instil one or two drops of a solution of Eserine, $\frac{1}{4}$ grain to the ounce, three or four times a day to expand the iris, so that if a rupture occurs the iris may act as a valve and not prolapse, necessitating cutting of the part projecting. If it lies over the opening it may return to its normal position when the anterior chamber refills; but if it is cut the exudation thrown out is very apt to entangle the iris in or against the cornea, resulting in a loss in appearance and usefulness of the eye. When the opening has closed and the chamber refilled and the iris attached to the cornea we may again use Eserine to draw the iris away.

Vascular Keratitis.—Inflammation of the cornea accompanied by the presence of vessels is well treated with Eserine, for its action contracts the calibre of the blood

vessels. The primary cause of the trouble whether local or constitutional must be treated also.

Conical Cornea.—The cone-shaped cornea is usually found in females of ten to twenty years and of delicate organization. This form of cornea when fully developed is readily recognized. In their incipency it will need care and the use of the keratoscope and ophthalmometer to make a diagnosis. This is the period when we can do the most good. By placing the general health at par, the use of well-selected and specially-ground glasses and the use of Eserine ($\frac{1}{4}$ grain to 1 ounce) *t. i. d.*, and a bandage at night we may arrest the progress and maintain the eye as a useful organ of vision. The refraction should be tested under atropine and then under Eserine. The glasses may be improved by ordering them ground as crossed cylinders perisopic or "Toric." Miss M. T., æt. 15, had well marked cornea of right eye, the left in an incipient stage. Ordered crossed cylinders, Eserine, bandage at night and change of occupation from seamstress to nurse-girl. Was placed under the care of her family physician. Now 19 vision $\frac{6}{12}$ and no trouble.

Episcleritis.—In all subacute and chronic cases of this affection Eserine acts well and aids the recovery. The recurring attacks may be very much shortened in their duration by timely use of this drug in weak solution. As this condition generally lasts for some time Eserine will permit the patient to follow his avocation. Of course, if gout, rheumatism, syphilis or tuberculosis is present it should be treated. Mr. J. F. had a typical dusky-red swelling of episcleritis tissue, which was treated with atropine, preventing him from performing easily his duties. A similar attack was treated with Eserine, and recovery was quicker and no inconvenience in business.

Iritic Adhesions.—Small thread-like adhesions between the iris and the lens may be found after an old attack of iritis. By dropping in a solution (1 grain to 1 ounce) of Eserine for a few times, and then a few drops of antropine 2 per cent. every 10 minutes, the attachments may yield.

Ciliary Fatigue.—Many occupations require the ciliary muscle to maintain a uniform tension several hours a day, and it is no surprise that it becomes tired. Even when all errors of refraction and insufficiencies of eye muscles are corrected the accommodation will sometimes become fatigued. The muscle is strengthened by using a solution of Eserine ($\frac{1}{20}$ grain to 1 ounce) one drop on retiring and another on rising. For example: Miss W. L., æt. 23, a school teacher in the day and a great reader in the evening, had suffered for years with accommodative asthenopia. Had consulted several oculists and her family physician. Examined her refraction and tested her eye-muscles and no change in glasses indicated. Ordered Eserine ($\frac{1}{20}$ grains to 1 ounce) one drop night and morning. Six months have elapsed and the eyes are comfortable.

Cataract.—Some surgeons prefer to have the iris well expanded when they operate for cataract, and so use Eserine. After the operation some instill it to prevent prolapse of the iris.

Glaucoma.—Eserine is THE drug used locally in glaucoma. This affection is characterized by increased intraocular tension. The symptoms are many and varied, the diagnosis must be made promptly and the treatment carefully observed. When the disease is suspected, Eserine (1 grain to 1 ounce) every three or four hours until the advice of an oculist can be secured, and then by the oculist until an operation is deemed necessary. Eserine by contracting the pupil to the size of a pin's head expands the iris and thus increases the size of the angle formed by the junction of the cornea and iris, thus permitting freer drainage into the canal of Schlemm, thereby reducing the increased intraocular tension. We must not rely too long on the effect of the drug, because the lost vision may not be regained even if the attack is very mild or very short in duration. Neither must we forget that there are constitutional conditions to be looked after. After an operation in glaucoma, Eserine is still used to keep the iris out of the iritic angle.

Conclusion.—There is nothing to be gained by using strong solutions of this drug. Three or four grains to the ounce of water is too strong a solution. Such solutions cause an engorgement of the blood in the ciliary plexus, which is harmful in all conditions, especially in glaucoma. Solutions should never be stronger than one grain to the ounce. When Eserine is prescribed in weak solutions for the eye affections it will be acknowledged to be a valuable drug and often preferable to atropine.

THE RELATION OF EYE SYMPTOMS TO URINARY EXCRETION—A CLINICAL STUDY.*

BY EDWARD W. WRIGHT, M. D.

THE relation of eye symptoms to disturbances of the kidney has been studied quite extensively of late years. Attention has, however, been focused upon the relation of Bright's disease and retinitis, and altogether too little has been given to other eye symptoms in their relation to anomalies of urinary excretion. The following cases are reported therefore for the purpose of calling attention to this relation, and of showing in a fragmentary way the importance of a careful study of the urinary excretion in all cases presenting anomalous or obscure eye symptoms.

The first case is that of a woman 52 years of age who presented glaucomatous symptoms. She had been informed that her disturbances of vision were the early signs of glaucoma, and had been warned of the dangers attending that affection. Two relatives were nearly blind, and for two years prior to coming under observation she was in great dread lest she would lose her vision. The subjective symptoms were frequent attacks of pain in one or both eyes,

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the vision was indistinct for distance, and she could not read without great effort and an increase of pain. Lights were surrounded with a halo. She was an occasional sufferer from headaches, which did not seem closely related to the eye strain, and was of decidedly neurotic temperament. She was unmistakably hypermetropic, with astigmatism, which was fully corrected both for near and distant vision. No muscular insufficiencies were discovered. During the attacks of pain there was no increase of intra-ocular tension and no cupping of the disk nor arterial pulsation—in fact no objective symptoms that pointed toward glaucoma. We informed her that she was not suffering from glaucoma, and began a careful search for other causes of the eye disturbances. Examination of the urine showed that there were crystals of oxalate of calcium present.

In this case it seemed sufficient to know that the eyes were free from structural defect, but the improvement of the urinary excretion by both diet and medicine was followed by a marked and rapid improvement in the eye symptoms, so that at the end of a short time she was able to use her eyes with comfort.

Another case was that of a woman who was amblyopic in one eye; the other had 1.25 d. cy. ax. 120 for distance, and 1 d. sph., 1.25 d. cy. ax. 120 for near vision. She complained of headaches and dizziness, which were increased by close use of the eyes. By wearing glasses the headaches were diminished and vertigo was lessened. The urine was examined and was found to contain no albumen, sugar, or casts. The urates were scanty, with uric acid in small amount. The total quantity in twenty-four hours was 23 ounces of a specific gravity of 1015, and contained only 247 grains of urea. The small amount of urates directed attention to the general system, and she was referred to her family physician, who gave her potassium iodide, regulated the diet, and recommended outdoor exercise. Under this treatment her headaches and vertigo disappeared, and the use of the eyes became easy and comfortable.

At this time the case was regarded by the family physician as one of incipient nephritis ; and this was confirmed, for after eighteen months a trace of albumen appeared in the urine. This was associated with a slight degree of retinitis, but there has been no return of the headaches or dizziness, nor has there been discomfort in using the eyes.

A third case was that of a male aged 23, in apparent good health, who complained of inability to use his eyes continuously without great discomfort. His refraction was .75 spherical and astigmatism. The extrinsic muscles were of good strength and well balanced. The glasses gave him some relief, but the eye symptoms did not disappear. Lotions and ointments were faithfully used. His complaints and other indefinite symptoms led to a careful examination of the urine, which revealed uric acid in great excess on three occasions. Appropriate diet was ordered, together with salicylate of soda, which was given in five-grain doses three times a day for two weeks, the treatment being then changed to lithia, which was continued for two months. This was followed by a disappearance of the irritation and hyperemia of the lids. He was enabled to leave off the use of glasses in the daytime, only employing them at night. There was a complete disappearance of all symptoms of eye strain.

A fourth case was that a woman 45 years of age who complained of pain in the eyes after reading for a short time ; sewing or reading in the evening was difficult and caused much distress. Refraction was .50 d. spherical in each eye for distance. She wore 1.50 d. spherical for near vision. The accommodation was weak, but the equilibrium of the extra-ocular muscles was maintained. Her nervous system was greatly impaired by a prolonged period of nursing and from anxiety and grief. The vitreous was a trifle hazy, but the fundus was normal. She had taken iron for a long time, but found herself no better. An examination of the urine, showed an excess of phosphates. She was advised to eat more animal food and to take plenty

of exercise in the open air. Phosphoric acid and hypophosphites were given, and she was advised to visit relatives in a northern city. This plan of treatment was faithfully adhered to, and upon her return she was able to read or write and use her eyes as much as she desired without the slightest pain or distress.

These few cases exemplify in a small degree the importance of the relation between the general system and the eyes, and emphasize the necessity of seeking diligently for all the causes which may influence the eyes in the performance of their function. In many cases all that is needed is to correct a refractive error when it is present, and this will be followed by a cessation of the eye symptoms. The purpose of this report, however, is to call attention to another class of cases in which there may be refractive error which does not give rise to symptoms until there is a disturbance of the general health or some abnormality in the excretions. In this latter class it is not sufficient to correct the refractive error alone, but in addition we must seek diligently for other causes which may keep up ocular irritation after eye strain has been removed as far as possible by proper correction.



READERS' CRAMP—AN ANALOGY.*

BY EDWARD W. WRIGHT, M. D.,

THE term "occupation neuroses" is a convenient designation for a group of maladies in which certain symptoms are excited by the attempt to perform some often-repeated muscular action, commonly one that is involved in the occupation of the sufferer (Gowers).

For the consideration of the analogy in symptoms, conditions, actions, causes, and effects between the muscles involved in writers' cramp and the ocular muscles, we have chosen, for the present, the title "Readers' Cramp."

Readers' cramp would include spasm or cramp of the muscular fibres of the iris, ciliary muscle, and of the extrinsic muscles of the eyes. It would not include nystagmus, except miners', the spasm accompanying paralysis of another muscle, or the spasm of ocular muscles, in meningitis, chorea, hysteria, or eclampsia, but the cramp or spasm produced by the use of the eyes at near range.

The main aim of the article will be to direct attention to cramp or spasm of the extrinsic muscles.

The typical features of this class of troubles are spasm or cramp, incoordination in the group of affected muscles, paresis in the group, with vasomotor and sensory disturbances.

Any occupation which calls for the excessive use of one group of muscles may give rise to these disorders, but those in which the smaller and more finely coordinated muscular groups are brought into action furnish the highest percentage of cases (Riggs, in Hare's *Therapeutics*).

When we consider the constant and continued muscular effort and exertion of the ocular muscles of those whose occupation necessitates the concentration of the eyes

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at their work, when we think of the fine adjustment and necessary equilibrium of this group of eye muscles essential for the duties of this occupation, when we remember how complex and delicately balanced are all the movements of the ocular group, it may be expected that spasm or cramp would easily arise.

With a foreign body in the eye we can see the spasmodic contraction of the splincter of the iris ; the effects of a spasm of the ciliary muscle we frequently observe; we can feel the spasm of the orbicularis palpebræ. Is it not safe to infer by analogy that a cramp or spasm of one or more of the extrinsic ocular muscles may occur ?

There must be a large amount of coordination taking place in the ocular muscular group in daily life. How, in the various movements of the eye, there must be, so to speak, the most delicate picking and choosing of the muscular instruments; how fine and exact must be the adjustment to obtain and maintain a proper continuous position of the two eyes under every condition!

How much more coordination is required in the eyes than in the hand. Adduction, abduction, flexion, and extension in the hand; adduction, abduction, elevation, and depression in the eyes; but with them accommodation and convergence. More intricate and complex must be the cells involved in coordination of the eyes than of the hand; more taxing and exhausting to the reader than to the writer.

If "reflex action," "irritable nerve centres," "irregular nervous energy," or "overwork of normal or weak muscles" cause cramps or spasms in other groups, why not in the ocular group, where a muscular equilibrium is more necessarily exact ?

If "grief," "overanxiety," "business responsibilities," "an irritative, sensitive neurotic temperament," or "impaired nutrition" are exciting causes at the beginning and continuance of occupational neuroses, why may not the same influence affect the ocular group in the same manner ?

Our text-books state that spasm of the extrinsic mus-

cles is rare and these cases had deviation of the eye—*e. g.*, *vide* Hock.

Readers' cramp is not of that nature producing an overaction sufficient to cause a marked deviation of the eye, but a spasmodic or cramped condition impairing the fine adjustment necessary for comfortable and continuous use of the eyes. Spasm of the extrinsic muscles in readers' cramp is short in duration, provoked by use of the eyes at close range for long periods of time, indicated by "jerking," "twitching," "pulling of eyes," associated with the feeling of eyes "turning," and often accompanied by headache and vertigo. The patient is conscious of great concentration of energy to keep the eyes on the work, resulting in great fatigue or inability to continue the use of the eyes. Besides these, there are vasomotor changes in the conjunctiva, chorioid, and retinae. On measuring or testing the strength of the muscles for near and far, we find that there is often a weakness of some individual muscle or pair of muscles. There is a lack of harmony in their action, a want of balance even when tested for a moment.

A person who has hypermetropic astigmatism with some muscular insufficiency wears a proper correcting sphero-cylinder and a well-selected prism. At times there are complaints when near work must be stopped at once, because the eyes "pull and twitch so," or "they jerk and hurt so," or "the letters or words dance so" that the patient becomes dizzy, or can not read or work until the eyes are closed and rested for a time. The sudden onset of one or more of these symptoms suggests a spasm or cramp.

Or a neurotic person of poor nutrition, with some refractive error and some muscular insufficiency, wearing a proper lens and a correcting prism, complains that the use of the eyes for near duties produces, after a time, a feeling as though the eyes were "turning." Is it not likely a cramp or spasm?

Have we not known persons with proper lenses who have reduced the use of their eyes for close work to a minimum

because of the sudden pulling, the sudden jerking, the inability to continue the use of the eyes?

Wearing a proper correction for their refraction and a prism to aid the weak muscles should give a condition practically normal, but the sudden inability to direct the eyes would suggest a spasm or cramp. They rest for a time, the cramp relaxes, and they go on to be abruptly stopped. Some say: "Oh! that's nervousness. You need a stronger prism. You must take ocular gymnastics." Others say: "It is imperative. You must have one of the muscles 'cut.'"

We, as oculists, do not see the patients at the time of the cramp or spasm. They leave the office or studio, the library or piano, the half-finished letter, or the partly read novel, and come to see us; but the cramp has relaxed.

It is interesting and instructive to have these patients come to the office near the end of their "busy day," and read, write, or sew until the troubles of this character come on, and then observe carefully the movements of the lids, iris, and eyes. Give them a page with lines ten to twelve inches long. Observe the movements of each eye, and see if one moves faster or slower than the other. Notice if the movement is steady and gradual, or jerky and irregular. Note if one eye seems to fix better than the other. Have them read under the weak illumination of a candle, and again under the brilliancy of an electric light. Mark the distance of the book from the eyes when beginning to read, and when they complain; also have them read with one eye closed or covered, and most carefully note the movement, if any, of the other.

Careful observation will give some hint of information confirmatory of irregular action, spasmodic or cramped action of some of the muscles of the ocular group.

This class of patients can work with one eye at near range with comfort. By alternating, they can obviate these troubles. This obviates the use of convergence. The rectus internus has only one duty to perform. Less coordination is needed. It goes to demonstrate the importance of the rela-

tionship of accommodation and convergence and the harmony necessary in coaction among the group of ocular muscles.

The fundamental or imperative law which governs the muscles of the eyeballs is that the fovea centralis retinæ of each eye must be fixed on the object observed. To secure such perfect binocular vision the inherent coordinate relations demand very intimate, very prompt, and delicately exact action of every individual muscle (Noyes).

The disturbance of movement in the ordinary amblyopia of strabismus differs in no essential respect from the congenital or early acquired disorder of vision due to anatomic-pathological changes. In the latter (nystagmus proper) there is a constant pendulum movement around the position of equilibrium; in the former twitching movements to one side, and known as nystagmus-like twitchings. In both forms there is deficient cortical innervation. In true nystagmus there is a steady, constant, uniform disorder of innervation, nystagmus-like twitchings appear in unequal and changing disturbance of innervation—as, for example, in rapid cortical exhaustion after unusual or forced movements (Knies).

In persons whose vision is, say, $\frac{6}{50}$ with correction, with insufficiency of some muscle (latent strabismus), with nervous system debilitated and the eyes used for unusually long periods, may there not be twitchings, invisible perhaps but sufficient to prevent perfect and comfortable binocular vision; in other words, spasms or cramps?

The most satisfactory explanation of the cause of writers' cramp is a want of balance of coaction of various motor centres concerned in the action of writing (Dercum).

May there not be a want of coaction of the various motor centres concerned in reading, and spasm or cramp must follow? May not a cortical exhaustion, permitting the nerve cells to evolve nerve energy excessively and irregularly produce a cramp in the muscles concerned in reading?

Knies, speaking of disorder of voluntary ocular muscles says: "In general, spasms play a subordinate part;

they are due to irritation of those parts whose destruction would cause paralysis."

Noyes writes: "The statement must also be made that many cases of muscular asthenopia are not evidences so much of defective power of certain muscles as of continued and excessive action or spasm of opposing and dominating muscles. Only in this view can many cases of recovery by prisms and by slight tenotomies be accounted for."

Alexander Duane writes: "It is not unlikely that slight degrees of muscular spasms are at the bottom of some of the cases of heterophoria that we meet with."

Also, finally, it is quite likely that a large number of cases of slight deviation are due to moderate underaction of one muscle combined with overaction (secondary spasm) of another.

The similarity between the constant action of the muscles of the fingers engaged in writing and the constant action of the muscles of the eyes in reading suggests the thought that as the former have sometimes cramp, so may the latter.

Writers' cramp has three chief theories regarding its pathology.

1. A local disease; a weakness in some muscles permits the overaction of their antagonists, which increases the spasm.

2. A reflex action; the result of the stimulation of the sensory nerves in the act of writing.

3. A central origin; a want of proper balance in the coaction of the motor centres concerned in the action of writing.

The latter seems to be the most satisfactory. In the muscular group of the eyes we can have all of the causes present. If the causes be present in the ocular muscles

that produce writers' cramp in the hand of writers, can we not have cramp in the muscles involved in reading?

Constant tension of all the ocular muscles at close range for long periods of time, with a weak individual muscle or pair of muscles, with overtaxed nerves, and an exhausted cortex, are the prominent conditions that would lead to spasm or cramp of the ocular group of muscles.

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